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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/539,691	03/31/2000	Takahiro Yamamoto	P/1071-1009	1017

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EXAMINER	
STAICOVICI, STEFAN	

ART UNIT	PAPER NUMBER
1732	24

DATE MAILED: 03/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/539,691	YAMAMOTO ET AL.	
	Examiner	Art Unit	
	Stefan Staicovici	1732	

-- The MAILING DATE of this communication appears on the cover sheet with the corresp ndence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 February 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on *13 March 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *June 19, 2000* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 20, 2003 (Paper No. 22) has been entered.

Response to Amendment

2. Applicants' amendment filed January 2, 2003 (Paper No. 19) has been entered. Claims 8-10 have been amended. Claims 1-4 and 15-18 have been canceled. No new claims have been added. Claims 5-10 are pending in the instant application.

3. In view of Applicants' Supplemental Request for Reconsideration filed February 20, 2003 (Paper No. 22) the rejections over US Patent No. 6,172,330 has been withdrawn.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 5, 7-8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakazawa *et al.* (US Patent No. 5,948,200) in view of Funami *et al.* (US Patent No. 5,055,653).

Nakazawa *et al.* ('200) teach the basic claimed process of machining a plurality of holes (feed-through holes) (SH) in a ceramic green sheet (5) including, providing a pulsed laser beam from a laser source (7), passing said laser beam through a transparent mask (8) (diffraction grating) to form a plurality of beams (see col. 7, lines 30-35), reflecting said plurality of beams off a galvano-mirror (9) having two degrees of freedom and simultaneously irradiating said ceramic green sheet (5) to form a plurality of holes (feed-through holes) (SH) (see col. 7, lines 3-35 and Figure 4). Further, Nakazawa *et al.* ('200) teach that said galvano-mirror (9) continuously changes the position of said beam by continuously changing the reflection angle in two directions (X,Y) (see col. 19, lines 8-16 and col. 20, lines 8-17) (repeatedly irradiating the ceramic green sheet...changing reflection angle of the galvano-scan mirror). Furthermore, it is submitted that in view of Applicants' remarks on page 3 of the amendment filed June 6, 2002 (Paper No. 12) that a "diffraction grating uses a large number of parallel closely spaced slits which provides a plurality of output light beams" said transparent mask (8) Nakazawa *et al.* ('200) is a "diffraction grating."

Regarding claim 5, Nakazawa *et al.* ('200) do not teach using converging lens to individually converge said plurality of beams. Funami *et al.*('653) teach a laser process

including, providing a laser beam (2e), splitting said laser by beam splitter (13) (forming a plurality of laser beams) and converging said plurality of laser beams (2f) using a convergent lenses (11) (see Figure 9 and col. 6, line 65 through col. 7, line 4). Therefore, it would have been obvious for one of ordinary skill in the art to have provided converging lenses for individually converging a plurality of laser beams as taught by Funami *et al.*('653) in the process of Nakazawa *et al.* ('200) because, Funami *et al.*('653) specifically teaches that such lenses provide equal laser energy densities at the machining spots, hence obtaining holes having a uniform size and shape.

In regard to claim 7, Nakazawa *et al.* ('200) teach the use of a positioning table (35) that moves said green sheet during laser processing (see col. 17, lines 27-36).

Specifically regarding claim 8, Nakazawa *et al.* ('200) teach passing said laser beam through a transparent mask (8) (diffraction grating) to form a plurality of beams (see col. 7, lines 30-35).

Regarding claim 10, Nakazawa *et al.* ('200) teach the use of a carrier film (1) (BF) (see Figure 4 and col. 7, lines 3-8).

6. Claims 5, 7-8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakazawa *et al.* (US Patent No. 5,948,200) in view of JP 10-034365 and in further view of Funami *et al.* (US Patent No. 5,055,653).

Nakazawa *et al.* ('200) teach the basic claimed process of machining a plurality of holes (feed-through holes) (SH) in a ceramic green sheet (5) including, providing a pulsed laser beam from a laser source (7), passing said laser beam through a transparent

mask (8) (diffraction grating) to form a plurality of beams (see col. 7, lines 30-35), reflecting said plurality of beams off a galvano-mirror (9) having two degrees of freedom and simultaneously irradiating said ceramic green sheet (5) to form a plurality of holes (feed-through holes) (SH) (see col. 7, lines 3-35 and Figure 4). Further, Nakazawa *et al.* ('200) teach that said galvano-mirror (9) continuously changes the position of said beam by continuously changing the reflection angle in two directions (X,Y) (see col. 19, lines 8-16 and col. 20, lines 8-17) (repeatedly irradiating the ceramic green sheet...changing reflection angle of the galvano-scan mirror).

Regarding claim 5, it is submitted that in view of Applicants' remarks on page 3 of the amendment filed June 6, 2002 (Paper No. 12) that a "diffraction grating uses a large number of parallel closely spaced slits which provides a plurality of output light beams" said transparent mask (8) Nakazawa *et al.* ('200) is a "diffraction grating." However, in order to address Applicants' concerns the teachings of JP 10-34365 are used to show the use of a phase grating (diffraction grating) to split a laser beam into a plurality of beams. Specifically, JP 10-34365 teaches a process for forming a plurality of holes in a plate using a phase grating (9) (diffraction grating) including, providing a laser beam, reflecting said laser beam off galvano-mirror (5) having two degrees of freedom and dividing said beam into a plurality of beams using said phase grating (9) (diffraction grating). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a phase grating (diffraction grating) as taught by JP 10-34365 in the process of Nakazawa *et al.* ('200) because Nakazawa *et al.* ('200) teaches the use of a beam splitter

to obtain multiple beams, whereas JP 10-34365 specifically teaches that a phase grating is preferable for splitting a laser beam. Further regarding claim 5, Nakazawa *et al.* ('200) in view of JP 10-34365 do not teach using converging lens to individually converge said plurality of beams. Funami *et al.*('653) teach a laser process including, providing a laser beam (2e), splitting said laser by beam splitter (13) (forming a plurality of laser beams) and converging said plurality of laser beams (2f) using a convergent lenses (11) (see Figure 9 and col. 6, line 65 through col. 7, line 4). Therefore, it would have been obvious for one of ordinary skill in the art to have provided converging lenses for individually converging a plurality of laser beams as taught by Funami *et al.*('653) in the process of Nakazawa *et al.* ('200) in view of JP 10-34365because, Funami *et al.*('653) specifically teaches that such lenses provide equal laser energy densities at the machining spots, hence obtaining holes having a uniform size and shape.

In regard to claim 7, Nakazawa *et al.* ('200) teach the use of a positioning table (35) that moves said green sheet during laser processing (see col. 17, lines 27-36).

Specifically regarding claim 8, Nakazawa *et al.* ('200) teach passing said laser beam through a transparent mask (8) (diffraction grating) to form a plurality of beams (see col. 7, lines 30-35). JP 10-34365 teaches a phase grating (9) (diffraction grating) that is transparent to the laser beam. Therefore, it would have been obvious for one of ordinary skill in the art to have provided a phase grating (diffraction grating) as taught by JP 10-34365 in the process of Nakazawa *et al.* ('200) in view of Funami *et al.*('653) because Nakazawa *et al.* ('200) teaches the use of a beam splitter to obtain multiple

beams, whereas JP 10-34365 specifically teaches that a phase grating is preferable for splitting a laser beam.

Regarding claim 10, Nakazawa *et al.* ('200) teach the use of a carrier film (1) (BF) (see Figure 4 and col. 7, lines 3-8).

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-034365 in view of Nakazawa *et al.* (US Patent No. 5,948,200) and in further view Funami *et al.* (US Patent No. 5,055,653).

JP 10-34365 teaches the basic claimed process of forming a plurality of holes in a plate using a phase grating (9) (diffraction grating) including, providing a laser beam, reflecting said laser beam off galvano-mirror (5) having two degrees of freedom and dividing said beam into a plurality of beams using said phase grating (9) (diffraction grating).

Regarding claim 6, JP 10-34365 does not teach a ceramic green sheet and repeatedly irradiating the sheet by changing reflection angle of the galvano-scan mirror. Nakazawa *et al.* ('200) teach laser machining a ceramic green sheet using a laser beam that has been divided into a plurality of beams. Further, Nakazawa *et al.* ('200) teach that a galvano-mirror (9) that continuously changes the position of a laser beam by continuously changing the reflection angle in two directions (X,Y) (see col. 19, lines 8-16 and col. 20, lines 8-17) (repeatedly irradiating the ceramic green sheet...changing reflection angle of the galvano-scan mirror). Therefore, it would have been obvious for one of ordinary skill in the art to have process a ceramic green sheet by continuously

changing the reflection angle in two directions as taught by Nakazawa *et al.* ('200) using the process of JP 10-34365 because, JP 10-34365 specifically teaches that a phase grating is preferable in dividing a laser beam and that a galvano-mirror is used for reflecting off the laser beam, and also because both references teach similar processes and solve a similar problem of dividing a laser beam into multiple beams to simultaneously drill a plurality of holes. Further regarding claim 6, JP 10-34365 in view Nakazawa *et al.* ('200) do not teach converging lenses for individually converging the plural laser beams. Funami *et al.*('653) teach a laser process including, providing a laser beam (2e), splitting said laser by beam splitter (13) (forming a plurality of laser beams) and converging said plurality of laser beams (2f) using a convergent lenses (11) (see Figure 9 and col. 6, line 65 through col. 7, line 4). Therefore, it would have been obvious for one of ordinary skill in the art to have provided converging lenses for individually converging a plurality of laser beams as taught by Funami *et al.*('653) in the process of JP 10-34365 in view Nakazawa *et al.* ('200) because, Funami *et al.*('653) specifically teaches that such lenses provide equal laser energy densities at the machining spots, hence obtaining holes having a uniform size and shape.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent No. 5,293,025) in view of JP 10-034365 and in further view of Funami *et al.* (US Patent No. 5,055,653).

Wang ('025) teaches the basic claimed process of machining a plurality of holes in a ceramic green sheet (23) (see col. 4, lines 48-58) including, providing a laser beam

from a laser source (3), reflecting said laser beam off galvano-mirrors (11, 15) having two degrees of freedom (X, Y), passing said laser beam through a splitter to form a plurality of beams (see col. 7, lines 1-3) and irradiating said ceramic green sheet (23) to form a plurality of holes (see col. 4, lines 3-30 and Figure 41). Further, Wang ('025) teaches that said galvano-mirrors (11, 15) continuously change the position of said laser beam by continuously changing the reflection angle in two directions (X,Y) (see col. 6, lines 42-63) (repeatedly irradiating the ceramic green sheet...changing reflection angle of the galvano-scan mirror).

Regarding claim 6, although Wang ('025) teaches the use of a beam splitter to obtain multiple beams, Wang ('025) does not specifically teach a diffraction grating. JP 10-34365 teaches a process for forming a plurality of holes in a plate using a phase grating (9) (diffraction grating) including, providing a laser beam, reflecting said laser beam off galvano-mirror (5) having two degrees of freedom and dividing said beam into a plurality of beams using said phase grating (9) (diffraction grating). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a phase grating (diffraction grating) as taught by JP 10-34365 in the process of Wang ('025) because Wang ('025) teaches the use of a beam splitter to obtain multiple beams, whereas JP 10-34365 specifically teaches that a phase grating is preferable in splitting a laser beam. Further regarding claim 6, although Wang ('025) teaches the use of a converging lens and a plurality of laser beams, Wang ('025) in view of JP 10-34365 do not teach converging lenses for individually converging the plural laser beams. Funami *et al.*('653) teach a

laser process including, providing a laser beam (2e), splitting said laser by beam splitter (13) (forming a plurality of laser beams) and converging said plurality of laser beams (2f) using a convergent lenses (11) (see Figure 9 and col. 6, line 65 through col. 7, line 4). Therefore, it would have been obvious for one of ordinary skill in the art to have provided converging lenses for individually converging a plurality of laser beams as taught by Funami *et al.*('653) in the process of Wang ('025) in view of JP 10-34365 because, Funami *et al.*('653) specifically teaches that such lenses provide equal laser energy densities at the machining spots, hence obtaining holes having a uniform size and shape.

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakazawa *et al.* (US Patent No. 5,948,200) in view of Funami *et al.* (US Patent No. 5,055,653) and in further view of Derwent 1988-159505.

Nakazawa *et al.* ('200) in view of Funami *et al.*('653) teach the basic claimed process as described above.

Regarding claim 9, although Nakazawa *et al.* ('200) teaches a YAG laser Nakazawa *et al.* ('200) in view of Funami *et al.*('653) do not teach a CO_2 laser. Derwent 1988-159505 teaches that CO_2 and Nd:YAG lasers are equivalent alternatives for laser drilling green ceramic sheets. Therefore, it would have been obvious for one of ordinary skill in the art to have used a CO_2 laser as an equivalent alternative to a YAG laser as taught by Derwent 1988-159505 in the process of Nakazawa *et al.* ('200) in view of Funami *et al.*('653) because Derwent 1988-159505 specifically teaches that CO_2 and

Nd:YAG lasers are equivalent alternatives for laser drilling green ceramic sheets, whereas Nakazawa *et al.* ('200) teaches a YAG laser and also because both Nakazawa *et al.* ('200) and Derwent 1988-159505 teach laser drilling of green ceramic sheets.

10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakazawa *et al.* (US Patent No. 5,948,200) in view of JP 10-034365 and in further view of Funami *et al.* (US Patent No. 5,055,653) and Derwent 1988-159505.

Nakazawa *et al.* ('200) in view of JP 10-034365 and in further view of Funami *et al.*('653) teach the basic claimed process as described above.

Regarding claim 9, although Nakazawa *et al.* ('200) teaches a YAG laser Nakazawa *et al.* ('200) in view of JP 10-034365 and in further view of Funami *et al.*('653) do not teach a CO_2 laser. Derwent 1988-159505 teaches that CO_2 and Nd:YAG lasers are equivalent alternatives for laser drilling green ceramic sheets. Therefore, it would have been obvious for one of ordinary skill in the art to have used a CO_2 laser as an equivalent alternative to a YAG laser as taught by Derwent 1988-159505 in the process of Nakazawa *et al.* ('200) in view of JP 10-034365 and in further view of Funami *et al.*('653) because Derwent 1988-159505 specifically teaches that CO_2 and Nd:YAG lasers are equivalent alternatives for laser drilling green ceramic sheets, whereas Nakazawa *et al.* ('200) teaches a YAG laser and also because both Nakazawa *et al.* ('200) and Derwent 1988-159505 teach laser drilling of green ceramic sheets.

Response to Arguments

11. Applicants' remarks filed February 20, 2003 (Paper No. 22) have been considered.

In view of Applicants' explanatory remarks filed February 20, 2003 (Paper No. 22) that the purpose of filing the Declaration under 37 CFR 1.131 was to establish that "the invention of US Patent No. 6,172,330 was **NOT** invented by 'another' ", the rejections over US Patent No. 6,172,330 has been withdrawn.

It should be noted that "although affidavits or declarations submitted for the purpose of establishing that the *reference discloses applicant's invention* (emphasis added) are properly filed under 37 CFR 1.132, rather than 37 CFR 1.131, such affidavits submitted improperly under 37 CFR 1.131 will be considered as though they were filed under 37 CFR 1.132 to traverse a ground of rejection. In re Facius, 408 F.2d 1396, 161 USPQ 294 (CCPA 1969)" (*see* MPEP §715.01(a)).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stefan Staicovici, Ph.D. whose telephone number is (703) 305-0396. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM and alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard D. Crispino, can be reached at (703) 308-3853. The fax phone number for this Group is (703) 305-7718.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

Stefan Staicovici, PhD

Primary Examiner 3/7/03

AU 1732

March 7, 2003